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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/084,622	02/28/2002	Seung-jin Song	1751-300	1618
6449	7590	03/22/2004	EXAMINER	
ROTHWELL, FIGG, ERNST & MANBECK, P.C. 1425 K STREET, N.W. SUITE 800 WASHINGTON, DC 20005			DEO, DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 03/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/084,622	SONG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	DuyVu n Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2002.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-10,12,14 and 17-21 is/are rejected.
- 7) ☒ Claim(s) 3,11,13,15 and 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/28/02</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 2, 4, 5, 8, 9, 10, 12, 14, 17, 18, 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Ghodsian (US 2002/0115293).

Ghodsian describes a method for etching a substrate comprising: forming a passivation layer 24 (claimed buffer layer) on the first plane of the substrate (paragraph [0231]); forming a gold layer (claimed metal layer) on the buffer layer (paragraph [0191], [0242]); forming an

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etching mask pattern on the second plane opposite the first plane (paragraph [0257]-[0259]);  
through-etching the substrate using the etching mask pattern (paragraph [0260]).

Referring to claim 2, the method further comprises forming a recess region on the first plane before forming the buffer layer on the first plane (paragraph [0229]).

Referring to claims 4, 5, 17, 18, the substrate is single-crystal silicon (paragraph [0201]) and the buffer layer is silicon dioxide (paragraph [0199], [0200]).

Referring to claims 8 and 21, figure 1F shows the recess region is formed at a predetermined depth on the first plane and figures 1EE and 1FF show the mask on the second plane opposite the first plane exposing a region corresponding to the recess region or a portion of the substrate which is penetrated by the through-etching of the substrate comprises the recess region.

Referring to claims 9 and 10, the method further comprises forming the etching mask pattern including a photoresist pattern and passivation layer 8, etching a portion of the substrate with the etching mask and removing the photoresist and the passivation by first cleaning process (paragraph [0225]-[0230]).

Referring to claim 12, the first etching mask further comprises a photoresist pattern (paragraph [0257]-[0259]).

Referring to claim 14, the method further comprises wet-etching the passivation layer 24 (claimed first buffer layer) that is exposed by the through-etching of the substrate (figure 1GG; paragraph [0190], [0261]).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghodsian as applied to claims 1 and 8 above, and further in view of Khanna et al. (Microfabrication Protocols for Deep RIE and Wafer Level Bonding).

Referring to claims 7 and 20, even though Ghodsian doesn't describe the through-etching of the substrate is performed by deep RIE. However, he suggests that any dry etching known in the art can be used (paragraph [0186]). Khanna describes an etching method of the substrate that is known to one skill in the art. The etching method is deep RIE (the whole article). Therefore, at the time of the invention, any dry etching which is known one skill in the art such as DRIE would be obvious to be used in order to etch the substrate with a reasonable expectation of success.

5. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghodsian.

Unlike claimed invention, Ghodsian doesn't describe using Al as the metal layer. However, it would have been obvious for one skill in the art to use Al because Al would be a heat absorbent material as suggested to be used by Ghodsian (paragraph [0191], [0242]). At this time, using either gold or Al would provide a heat absorbent material with a reasonable expectation of success.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

There is no definition of "DIRE" in the specification. Correction is required. At this time, it would be understood as deep reactive ion etching.

***Allowable Subject Matter***

8. Claims 3, 11, 13, 15, and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Referring to claims 3 and 15, Ghodsian doesn't suggest or provide motivation that after through-etching the substrate, removing the metal layer and the buffer layer.

Referring to claim 11, Ghodsian doesn't suggest that the second etching mask pattern (for etching the recess region on the first plane) is a stacked structure comprising a second buffer layer and a second metal layer. His second etching (for etching the recess region on the first plane) includes a passivation oxide layer 8, and a photoresist (paragraph [0225]-[0230]).

Referring to claims 13 and 16, Ghodsian doesn't suggest that the first etching mask pattern (for through-etching of the substrate) is a stacked structure comprising a third buffer layer and a third metal layer. He describes the mask ((for through-etching of the substrate) a passivation oxide layer 8 and a photoresist layer (paragraph [0257]-[0259]).

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-3:30; with alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DVD  
3/16/04

*gd*